

REMARKS

New claims 15-20 have been added. No new matter was added. Thus, claims 1, 2 and 7-20 are pending in the present application for further prosecution. Applicants submit arguments for overcoming the rejections based on the prior art of record. Accordingly, Applicants respectfully submit that claims 1, 2 and 7-20 are in condition for allowance.

I. Claim Rejection - 35 USC §103(a)

In the non-final Office Action dated April 9, 2009, claims 1, 2 and 7-14 are rejected under 35 USC §103(a) as being obvious over U.S. Patent No. 6,619,537 B1 issued to Zhang et al. in view of JP 03-079734 A of Fukuda and in further view of U.S. Patent No. 6,579,431 B1 issued to Bolcavage et al.

The Zhang et al. patent

The Zhang et al. patent discloses an assembly including: (i) a pure copper sputtering target; (ii) a copper alloy backing plate; and (iii) a separate nickel alloy interlayer. The nickel alloy interlayer is sandwiched between the target and backing plate and joins the target to the backing plate. By way of example, see FIG. 1 of Zhang et al. which shows a target (12), separate interlayer (20), and backing plate (16) as a three layer assembly (10). On column 1, line 66, to column 2, line 8, Zhang et al. teach to one of ordinary skill in the art that the target should not be directly solder bonded to the backing plate; and on column 2, lines 9-21, Zhang et al. teach to one of ordinary skill in the art that the target should not be directly diffusion bonded to the backing plate. Rather, Zhang et al. clearly provides the following teaching to one of ordinary skill in the art (see column 2, lines 22-24):

“To eliminate this intermetallic phase and improve bond strength, it is necessary to use an interlayer, such as Ni or Ti, between the target and the backing plate.”

Accordingly, the sole purpose of the interlayer of Zhang et al. is to “bond” the target to the backing plate and Zhang et al. clearly teach that the target should not be directly bonded to the backing plate (i.e., it is “necessary to use an interlayer”).

The Bolcavage et al. patent

A similar disclosure is provided by the Bolcavage et al. patent. It discloses an assembly including: (i) a metallic sputtering target; (ii) an aluminum or aluminum alloy backing plate; and (iii) a nickel interlayer. The nickel interlayer is sandwiched between the target and backing plate and joins the target to the backing plate. By way of example, see the FIGs. of Bolcavage et al. which show a target (12), nickel interlayer (50), and aluminum or aluminum alloy backing plate (16). In FIG. 1 of Bolcavage et al., the nickel interlayer (50) includes the interface (16) which includes a portion (22) “composed primarily of nickel” and first and second intermediate portions (18 and 20).

Accordingly, the sole purpose of the interlayer of Bolcavage et al. is to “bond” the metallic target to the aluminum or aluminum alloy backing plate.

With respect to the interpretation of the subject matter disclosed by the Bolcavage et al. patent, Applicants request reconsideration. In the Office Action, it is stated that Bolcavage et al. disclose “copper backing plates”. Applicants respectfully submit that this is an error. Bolcavage et al. merely disclose the use of aluminum or aluminum alloy backing plates. In addition, it is stated in the Office Action that Bolcavage et al. teaches a Ni alloy interlayer including 1% of Ni with Cr (col. 7, lines 44-56). Applicants believe that this is also inaccurate and request reconsideration. Applicants respectfully submit that the Ni alloys taught by Bolcavage et al. are 1% Al with the remainder (99%) being Ni and 1% of Cr with the remainder (99%) being Ni.

JP 03-079734

The JP '734 reference discloses a copper alloy backing plate including 0.05 to 0.8% by weight of Cr with the balance being copper. The copper alloy can also include 0.01% by weight of Si and/or 0.001 to 0.5% by weight of Mg.

JP '734 clearly fails to disclose a copper alloy including Ni.

Patentability Argument

For each of the following reasons, Applicants respectfully submit that claims 1, 2 and 7-14 are non-obvious and patentable over Zhang et al. in view of JP '734 and the Bolcavage et al. patent.

(i) Bolcavage et al. has been misinterpreted

Claim 1 of the present application recites a Cu-Ni-Si alloy backing plate specifically required to contain 2 to 4 wt% of Ni.

The primary reference, Zhang et al., requires the use of a separate interlayer made of a Ni alloy (i.e., the primary component (greater than 50%) of the alloy being Ni). The JP '734 reference discloses the use of no nickel (0%). Accordingly, the Office Action relies on column 7, lines 54-55, of Bolcavage et al. for "use of approximately 1% Ni for the backing plate material". However, this is an error.

Column 7, lines 54-55, of Bolcavage et al. discloses "Ni alloys" having 1% of Al or Cr with the remainder (99%) being nickel. Accordingly, neither Zhang et al. nor Bolcavage et al. discloses a backing plate made of a Cu-Ni-Si alloy containing 2 to 4 wt% of Ni. In contrast, Zhang et al. and Bolcavage et al. disclose "Ni alloys" in which Ni is the primary component (up to 99%).

For at least this reason, Applicants respectfully submit that claims 1, 2 and 7-14 are non-obvious over Zhang et al. in view of JP '734 and further in view of the Bolcavage et al. patent. Applicants respectfully request reconsideration and removal of the rejection.

(ii) The references disclose "Interlayers", not alloys for backing plates

None of the references disclose backing plates made of Cu-Ni-Si alloys.

Zhang et al. and Bolcavage et al. disclose "interlayers" that are sandwiched between the backing plate and the target and that are separate components of the assembly. Only the "interlayers" include Ni. None of the "backing plates" disclosed by Zhang et al., Bolcavage et al. and JP '734 is made of an "alloy" specifically including 2 to 4wt% of Ni.

An "alloy" is a uniform mixture of metals; typically the metals are uniformly mixed together in a molten state. The mere fact that the separate Ni-alloy "interlayer" of Zhang et al. and Bolcavage et al. is bonded to a surface of a backing plate does not make the backing plates an "alloy" including Ni. Any Ni which diffuses into the backing plate will be located close to the surface of the backing plate and will not be uniformly distributed throughout the thickness of the backing plate. Accordingly, the combination of the Ni alloy "interlayer" bonded to the backing plate does not make the combination an "alloy". An alloy requires a uniform composition which neither Zhang et al. nor Bolcavage et al. disclose. For example, see FIG. 1 of Zhang et al. in which diffusion of the Ni alloy interlayer (20) is limited to a minor thickness of the assembly (10) between reference numerals (14) and (18) and not throughout the full thickness of backing plate (16). Similar observations can be made by viewing FIG. 1 of the Bolcavage et al. patent.

Accordingly, Applicants respectfully submit that it is an error to conclude that “the interlayer is included as the backing plate since said interlayer is interdiffused to the backing plate”. Applicants respectfully submit that the interlayer is “bonded” to the backing plate, but it is certainly not “alloyed” with the backing plate such that the combination produces an “alloy” by definition. The claims of the present application are clearly directed to a backing plate made of an “alloy” of Cu, Ni and Si.

For at least the above reason, Applicants respectfully submit that claims 1, 2 and 7-14 are non-obvious over Zhang et al. in view of JP ‘734 and further in view of the Bolcavage et al. patent. Applicants respectfully request reconsideration and removal of the rejection.

(iii) The references “teach-away” from directly bonding a target to a backing plate

As stated above, Zhang et al. clearly states that it is “necessary” to use an interlayer” between the target and the backing plate. Bolcavage et al. provides a similar disclosure.

“Teaching away” is the antithesis of the art suggesting that the person of ordinary skill in the art go in the claimed direction. Essentially, “teaching away” is a per se demonstration of lack of obviousness. In re Fine, 873 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The assembly of the present application includes a backing plate made of specified alloy bonded directly to the target without an interlayer therebetween.

For at least this reason, Applicants respectfully submit that claims 1, 2 and 7-14 are non-obvious over Zhang et al. in view of JP ‘734 and further in view of the Bolcavage

et al. patent. Applicants respectfully request reconsideration and removal of the rejection.

(iv) One of Ordinary Skill in the Art Cannot Arrive at the Present Invention based on the cited combination of references

The U.S. Supreme Court in KSR International v. Teleflex Inc., 127 S.Ct. 1727, 82 USPQ2d 1385, has made it clear that “rejections on obviousness grounds cannot be sustained by mere conclusory statements”; rather, there must be “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”. Applicants respectfully submit that, when the standards required by the U.S. Supreme Court in KSR to reach the legal conclusion of obviousness are properly applied to claims 1, 2 and 7-14 of the present application, one of ordinary skill in the art using common sense would clearly not find the subject matter recited by the claims of the present application to be obvious based on a combination of Zhang et al. in view of JP ‘734 and further in view of the Bolcavage et al. patent.

Zhang et al. and Bolcavage et al. disclose assemblies requiring a separate nickel alloy “interlayer” located between the target and backing plate and fail to disclose a backing plate of the claimed alloy. Zhang et al. fail to disclose an alloy backing plate having Ni and Si alloyed with copper. The backing plate of Bolcavage et al. is limited to aluminum and aluminum alloy and fails to disclose the presence of Cu, Ni and Si. Finally, JP ‘734 discloses a backing plate without Ni.

Accordingly, one of ordinary skill in the art using common sense would not arrive at the present invention based on these references. One of ordinary skill in the art following these teachings would certainly find it “necessary” to use a separate interlayer between the target and

backing plate. Also, the alloys of the backing plates taught by the cited references are clearly different. One of ordinary skill in the art using common sense understands that the physical properties of a material changes as the composition and weight percentages are altered. As clearly shown by the Examples relative to the Comparative Examples disclosed on pages 7-11 of the present application, as filed, copper alloy backing plates of different compositions clearly do not provide the same characteristics. As discussed in the application, the Comparative Examples are not suitable as backing plates as a matter of course. Thus, Applicants respectfully submit that the combination of Zhang et al. in view of JP '734 and further in view of the Bolcavage et al. to reject the claims of the present application is based on "mere conclusory statements" without "rational underpinning" required to support the legal conclusion of obviousness as dictated by the U.S. Supreme Court in KSR.

For these reasons, Applicants respectfully submit that claims 1, 2 and 7-14 are non-obvious over Zhang et al. in view of JP '734 and further in view of Bolcavage et al. and are patentable. Applicants respectfully request reconsideration and removal of the rejection.

(v) Claims 7 and 10 are patentable for additional reasons

Dependent claims 7 and 10 are patentable and are not obvious over Zhang et al. in view of JP '734 and further in view of Bolcavage et al. for an additional reason. These claims require the copper alloy backing plate to have "an electrical conductivity of 35 to 60% (IACS), and 0.2% proof stress of 400 to 850MPa".

In the Office Action, these claims are rejected merely because the backing plate produced by the combination of Zhang et al. in view of JP '734 and further in view of Bolcavage et al. would be "expected" to possess the claimed properties. Applicants respectfully disagree and request reconsideration.

As discussed above, the necessary use of a Ni alloy interlayer as required and disclosed by Zhang et al. and Bolcavage et al. only includes Ni at the surface of the backing plate. For example, see layer (24) in FIG. 1 of Zhang et al. and compare it to the full thickness of the backing plate (16). The same is shown in FIG. 1 of Bolcavage with respect to layer (18) and the full thickness of the backing plate (12). It is clear that the Ni is not alloyed with the backing plate and is not uniformly distributed throughout the thickness of the backing plate. Accordingly, one of ordinary skill in the art would clearly not “expect” such an assembly to have the same physical properties as that of the “alloy” backing plate of the present invention, which by definition includes Ni and Si uniformly distributed throughout the entire backing plate and not just on a surface thereof.

Further, none of the compositions overlap with that of the present invention. As discussed above, one of ordinary skill in the art using common sense understands that the physical properties of a material changes as the composition and weight percentages are altered. As clearly shown by the Examples relative to the Comparative Examples disclosed on pages 7-11 of the present application, as filed, copper alloy backing plates of different compositions clearly do not provide the same characteristics. As discussed in the application, the Comparative Examples are not suitable as backing plates as a matter of course.

For these reasons, Applicants respectfully submit that claims 1, 2 and 7-14 are non-obvious over Zhang et al. in view of JP ‘734 and further in view of Bolcavage et al. and are patentable. Applicants respectfully request reconsideration and removal of the rejection.

II. New Claims 15-20

New claims 15-20 have been added. No new matter was added.

New independent claim 15 is similar to claim 1, except that the alloy of the backing plate is limited to the low beryllium copper alloy recited in claim 1. See page 6, lines 19-22, and page 7, line 4, of the present application, as filed, for a disclosure of the target diffusion bonded to the backing plate.

New independent claim 17 is similar to claim 1, except that the alloy of the backing plate is limited to the Cu-Ni-Si alloy recited in claim 1. See page 6, lines 19-22, and page 7, line 4, of the present application, as filed, for a disclosure of the target diffusion bonded directly to the backing plate.

The subject matter of new claims 16 and 20 are supported by the subject matter disclosed by claim 7 of the present application, and the subject matter of new claims 18 and 19 are supported by the subject matter disclosed by claim 2 of the present application, as filed.

III. Conclusion

In view of the above amendments and remarks, Applicants respectfully submit that the claim rejections have been overcome and that the present application is in condition for allowance. Thus, a favorable action on the merits is therefore requested.

Please charge any deficiency or credit any overpayment for entering this Amendment to our deposit account no. 08-3040.

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